IBM Ethernet Switch r-series high-capacity modular Ethernet switches for versatile deployment

Table of contents

1 Overview
2 Key prerequisites
2 Planned availability date
3 Description
8 Product number
11 Publications
12 Technical information
20 Terms and conditions
23 Prices
23 Announcement countries

At a glance

The IBM® Ethernet Switch r-series family includes:

- Four slot IBM Ethernet Switch B04R (4003-R04)
  - Up to 64x 10 GbE or 192x 1 GbE ports per system
- Eight slot IBM Ethernet Switch B08R (4003-R08)
  - Up to 128x 10 GbE or 384x 1 GbE ports per system
- Sixteen slot IBM Ethernet Switch B16R (4003-R16)
  - Up to 256x 10 GbE or 768x 1 GbE ports per system
- Thirty-two slot IBM Ethernet Switch B32R (4003-R32)
  - Up to 512x 10 GbE or 1,536 1 GbE ports per system

Overview

IBM Ethernet r-series switches are designed to meet the needs of data centers, large enterprises, high-performance computing (HPC) environments, and Internet exchanges and Internet service providers (IXPs and ISPs) as a highly dense aggregation or distribution switch.

IBM Ethernet r-series switches are well suited for high-performance computing environments. They are designed to offer low latency through the switch with densities of 10/100/1000 Ethernet, fiber Gigabit Ethernet and 10-Gigabit Ethernet in compact size chassis with up to 1,536 ports of Gigabit Ethernet or 512 ports of 10-Gigabit Ethernet in a single chassis. The high-performance architecture offers up to 3.2 Terabits per second (Tbps) of data switching. IBM Ethernet r-series switches are available in four chassis models, allow network designers to standardize on a single product family for end-of-row, aggregation, and backbone switching, and are well suited for data center and enterprise deployment.

IBM Ethernet r-series switches come in 4-slot, 8-slot, 16-slot, and 32-slot configurations and are designed to deliver the following capabilities:

- Compact chassis design supports high-density single rack configurations - up to 512 10-Gigabit Ethernet and 1,536 Gigabit Ethernet ports in a 32-slot chassis
- IPv4 and IPv6 Layer 2 and Layer 3 unicast and multicast support for powerful and flexible network deployment
- System redundancy (management module, switch fabric module, and power) across all r-series chassis

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- Interchangeable half-height line modules reduce sparing costs and provide cost-effective modular growth
- Scalable hardware-based IP routing to 512,000 IPv4 routes per line module
- Advanced virtual output queue (VoQ) design eliminates head-of-line blocking and provides scalable quality of service (QoS)
- End-to-end quality of service (QoS) supported with hardware based honoring, marking and congestion management
- High-availability design features redundant and hot-pluggable hardware, Layer 2 software upgrades and Border Gateway Protocol (BGP) and Open Shortest Path First (OSPF) restart
- Advanced nonblocking Clos fabric features adaptive self-routing with system degradation in the event of two or more module failures
- Embedded sFlow per port supports scalable hardware-based traffic monitoring across all switch ports without impacting performance

Key prerequisites

IronWare Operating System level R2.7.02, or later.

For a list of supported servers, refer to the Hardware requirements section.

Planned availability date

September 4, 2009:

- IBM Ethernet Switch B04R (4003-R04)
- IBM Ethernet Switch B08R (4003-R08)
- IBM Ethernet Switch B16R (4003-R16)

October 30, 2009:

- IBM Ethernet Switch B32R (4003-R32)

The following geographies/countries apply to both planned availability dates above:

- U.S. and Canada
- All European, Middle Eastern, and African countries except:

  Algeria, Bahrain, Benin, Botswana, Burundi, Cameroon, Chad, Djibouti, Eritrea, Belarus, Ethiopia, Gabon, Gambia, Ghana, Guinea, Jordan, Kuwait, Lesotho, Liberia, Malawi, Mali, Mauritania, Moldavia, Montenegro, Mozambique, Niger, Nigeria, Oman, Qatar, Russia, Rwanda, Serbia, Somalia, Tanzania, Togo, Uganda, Zambia, Burkina Faso, Cape Verde, Central African Republic, Congo, Republic of the, Cote d'Ivoire, Sierra Leone, United Arab Emirates, South Africa, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Armenia, Turkmenistan, Ukraine, Uzbekistan, Iraq, Lebanon, Tajikistan, Yemen, and West Bank.
- All Latin American countries except:

  Belize, Brazil, Dominican Republic, Nicaragua, Mexico, Suriname, Haiti, and Venezuela.
- All Asia Pacific countries except:

  Brunei, Laos, Maldives, Mongolia, Myanmar (Burma), Cambodia, China, Vietnam, Nepal, Papua New Guinea, Samoa, and Wallis and Futuna.

Description

IBM Ethernet r-series switches are designed to help address the needs of data centers and large enterprises where high-density Ethernet switches are needed. IBM Ethernet r-series switches include the four slot IBM Ethernet Switch B04R (4003-R04), eight slot IBM Ethernet Switch B08R (4003-R08), sixteen slot IBM Ethernet Switch B16R (4003-R16), and thirty-two slot IBM Ethernet Switch B32R (4003-R32) models. These switches offer high port capacity and density, based on the number of available slots, with up to 512 10-Gigabit Ethernet or 1536 1-Gigabit Ethernet ports in a single 32-slot chassis.

The IBM Ethernet r-series switches are designed for nonstop operation, supporting 1:1 management module redundancy, N+1 switch module redundancy, M+N power module redundancy, and N+1 fan redundancy. Each of these hardware components are hot-swappable, reducing service downtime. This hardware resiliency is designed to be enhanced with software resiliency including system failover, restart, MRP, VSRP, and VRRP for Layer 2 and Layer 3 resiliency.

Systems configured with dual management modules have subsection detection and failover. Hitless Management Failover (HMF) ensures that the forwarding engines on the line modules are not impacted by a management failover, and enables nonstop packet forwarding during a management failover. With hitless Layer 2 software upgrades and graceful restart routing, fast convergence occurs in the event of a management module failure.

The IBM Ethernet r-series switches are designed to help network planners deploy an Ethernet infrastructure that addresses today's requirements with a scalable architecture designed to support network growth and evolution. The switches incorporate the latest advances in switch architecture, system resilience, quality of service (QoS) and switch security in a family of modular chassis settings.

The switch architecture is an adaptive self-routing Clos switch fabric with a virtual output queue (VOQ) design. This nonblocking architecture is optimized for maximum throughput and low latency for all size packets. This scalable design can help with the reliable delivery of all IP-based voice, video, and data applications.

The switches ship with the Brocade IronWare software, embedded sFlow per port, advanced IPv4/IPv6 Ethernet Layer 2 switching, IPv4/IPv6 L3 routing, and multilayer security services.

The IBM Ethernet r-series switches are designed to support industry-leading Layer 2 features. To provide self-healing topologies in Layer 2 configurations, the switches support industry standard Ethernet protocols including Spanning Tree

Protocol (STP), Rapid Spanning Tree (RSTP), per VLAN STP (PVST), per VLAN group STP (PVGST), and Multi-instance Spanning Tree (MSTP). The switches can also support Brocade Metro Ring Protocol (MRP) for sub-second service restoration in ring topologies, Virtual Switch Redundancy Protocol (VSRP) for redundant switch configurations, VLAN topology grouping, and VLAN tunneling for advanced Layer 2 service configurations.

The IBM Ethernet r-series switches are designed to support Layer 3 feature set for scalable Exterior Gateway and Interior Gateway Protocols (EGP and IGP). The switches can support a wide array of IPv4 routing protocols including RIPv1/v2, OSPFv2, BGP-4, and IS-IS. To future-proof the network, support for IPv6 routing protocols include RIPng, OSPFv3, and BGP-4+.

A scalable, resilient network can be built using IEEE 802.3ad Link Aggregation for up to eight links. BPDU Guard and Root Guard support prevent rogue hijacking of the spanning tree root and maintain a contention-free and loop-free environment, especially during dynamic network deployments. Additionally, IP SouceGuard can be configured to prevent IP source address spoofing.

With Brocade Direct Routing (BDR), the Forwarding Information Base (FIB) is downloaded to the hardware-based forwarding engine on each line module. Policy Based Routing (PBR) allows customizable routing policies using ACLs. This feature can be used to balance network usage by controlling the network paths for different traffic flows.

Virtual Router Redundancy Protocol (VRRP) and VRRPE enable the switches to operate as a backup router to other network routers. In the event of a router failure, the switch can automatically and seamlessly perform the task of the failed router.

The IBM Ethernet r-series switches can help to meet the growing use of streaming video and voice in a converged network by providing hardware-based support for a number of multicast protocols including MSDP, PIM-SM, and PIM-DM. This allows network managers to efficiently deploy next generation multicast applications.

Network administrators can enforce QoS policies based on port, VLAN, source MAC, ACL rules, IEEE 802.1p priority, Type of Service (ToS), DiffServe settings, or Rate Limiting status. The wide variety of methods supported can help administrators to granularly tune traffic according to their needs, such as strict priority for Voice over IP, video, and high-performance computing applications.

Combinations of Strict Priority (SP) and Weighted Fair Queuing (WFQ) can provide flexibility for network administrators. In the event of egress port congestion, traffic policies can be configured for tail drop or weighted random early detection (WRED) operation.

Advanced bandwidth management can allow intelligent bandwidth management using hardware based enforcement of Committed Information Rate (CIR) with Excess Burst control capabilities and seamless integration with other QoS features.

Wire-speed Access Control Lists (ACL) is designed to control packet forwarding and restrict access to the system management interface, while providing wire-speed switching and routing. An extensible ACL implementation for Layer 3 and Layer 4 information identifies traffic based on source or destination IP address, IP protocol type, TCP or UDP port, IP precedence, or ToS values. Flexible Layer 2 implementation identifies traffic based on source or destination MAC address, Ethernet type, VLAN-ID values, and 802.1p values.

High priority voice and data traffic flow through the chassis utilizing the high performance hardware-based QoS features of the switches. Wire-speed security can be maintained by locking out unauthorized users with port security, by filtering DoS and unauthorized traffic with ACLs, and by monitoring traffic flows with sFlow. The switches can allow you to grow from just 24 ports of 10/100/ 1000 at the edge and up to 1,536 ports of 10/100/ 1000 or 512 ports of 10-Gigabit Ethernet in the core. A common architecture across the entire series can meet the demands of enterprise network needs while incorporating resiliency, security, and scalability in

an architecture designed to scale from the edge to the core to reduce the cost of ownership.

Optional features

The four slot IBM Ethernet Switch B04R (4003-R04), eight slot IBM Ethernet Switch B08R (4003-R08), sixteen slot IBM Ethernet Switch B16R (4003-R16), and thirty-two slot IBM Ethernet Switch B32R (4003-R32) models are available with a number of selectable options. Various Management, Switch Fabric, and Interface Modules can be installed in each slot, providing flexible connectivity options. Base models do not include any Interface Modules, and it is recommended that you order at least one to provide connectivity. You are not required to populate all ports with transceivers, but ports can only be used with the IBM supplied transceivers specified in this document.

All base systems include one Management Module and a varying number of Switch Fabric Modules and power supplies to support full throughput and power functionality.

32-slot Management Module (#1651): The 32-slot Management Module (#1651) controls the IBM Ethernet Switch B32R (4003-R32) hardware components, runs the networking protocols, and provides the Real Time Operating System (RTOS). Each 4003-R32 chassis requires one management module and can accept a second one for redundancy. Each management module contains two PCMCIA slots (requires #8710 for usage), a console port, and a 10/100/1000 Ethernet port for management.

4/8/16-slot Management Module (#1652): The 4/8/16-slot Management Module (#1652) controls the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), and IBM Ethernet Switch B16R (4003-R16) hardware components, runs the networking protocols, and provides the Real Time Operating System (RTOS). Each 4003-R04, 4003-R08, or 4003-R16 chassis requires one management module and can accept a second one for redundancy. Each management module contains two PCMCIA slots (requires #8710 for usage), a console port, and a 10/100/1000 Ethernet port for management.

8/16-slot Switch Fabric Module (#1653): The 8/16-slot Switch Fabric Module (#1653) for the IBM Ethernet Switch B08R (4003-R08) and IBM Ethernet Switch B16R (4003-R16) chassis switches data packets between interface modules installed within the same chassis. The 4003-R08 accommodates three switch fabric modules with two required for full throughput plus one redundant. The 4003-R16 accommodates four switch fabric modules with three required for full throughput plus one redundant.

4-slot Switch Fabric Module (#1654): The 4-slot Switch Fabric Module (#1654) for the IBM Ethernet Switch B04R (4003-R04) chassis switches data packets between interface modules installed within the same chassis. The 4003-R04 accommodates three switch fabric modules with two required for full throughput plus one redundant.

4-port Ethernet Module 10 GbE (XFP) (#1661): The 4-port Ethernet Module 10 GbE (XFP) (#1661) interface module allows the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) to connect to other network devices at a fixed speed of 10 Gbps. Each physical port requires a qualified XFP transceiver for connectivity.

16-port Ethernet Module 10 GbE (SFP+) (#1662): The 16-port Ethernet Module 10 GbE (SFP+) (#1662) interface module allows the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) to connect to other network devices at a fixed speed of 10 Gbps. Each physical port requires a qualified SFP+ transceiver for connectivity.

24-port Ethernet Module 10/100/1000 MbE (RJ45) (#1663): The 24-port Ethernet Module 10/100/1000 MbE (RJ45) (#1663) interface module allows the

IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) to connect to other network devices at an auto-sensing and auto-negotiated speed of 10 Mbps, 100 Mbps, or 1 Gbps. Each physical port provides connectivity through an RJ-45 connector.

48-port Ethernet Module 10/100/1000 MbE (MRJ-21) (#1664): The 48-port Ethernet Module 10/100/1000 MbE (MRJ-21) (#1664) interface module allows the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) to connect to other network devices at an auto-sensing and auto-negotiated speed of 10 Mbps, 100 Mbps, or 1 Gbps. There are eight physical ports with Mini RJ-21 (MRJ21) connectors that each support six 10/100/1000 MbE ports each. A cable with a MRJ21 connector breaking out into six individual RJ-45 connectors can be used to connect to each of the eight physical MRJ21 ports to support a total of 48x 10/100/1000 MbE connections from this interface module.

For information on available products, and where to buy MRJ21 cabling and patch panels, contact your IBM representative or visit

http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/DCN_MiniRJ21_Cable_Information

24-port Ethernet Module 100/1000 MbE (SFP) (#1665): The 24-port Ethernet Module 100/1000 MbE (SFP) (#1665) interface module allows the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) to connect to other network devices at an auto-negotiated speed of 100 Mbps or 1 Gbps. Each physical port requires a qualified SFP transceiver for connectivity.

4003-R32 Firmware Upgrade Renewal, one year (#7090): The initial purchase of an IBM Ethernet Switch B32R includes one year of firmware upgrade entitlement. This feature provides you with one additional year of renewal for upgrades included in future releases of the IronWare firmware. You are not eligible to access new features and functions without the purchase of this feature.

4003-R16 Firmware Upgrade Renewal, one year (#7091): The initial purchase of an IBM Ethernet Switch B16R includes one year of firmware upgrade entitlement. This feature provides you with one additional year of renewal for upgrades included in future releases of the IronWare firmware. You are not eligible to access new features and functions without the purchase of this feature.

4003-R08 Firmware Upgrade Renewal, one year (#7092): The initial purchase of an IBM Ethernet Switch B08R includes one year of firmware upgrade entitlement. This feature provides you with one additional year of renewal for upgrades included in future releases of the IronWare firmware. You are not eligible to access new features and functions without the purchase of this feature.

4003-R04 Firmware Upgrade Renewal, one year (#7093): The initial purchase of an IBM Ethernet Switch B04R includes one year of firmware upgrade entitlement. This feature provides you with one additional year of renewal for upgrades included in future releases of the IronWare firmware. You are not eligible to access new features and functions without the purchase of this feature.

Transceivers

You must install a SFP, SFP+, or XFP transceiver into each Gigabit Ethernet and 10 Gigabit Ethernet capable SFP, SFP+, or XFP port you want to use. Only IBM supplied transceivers can be used to populating the ports on these products.

XFP Transceiver 10GB Copper 15m CX4 (#2101): Provides passive 10 Gbps XFP transceiver (10GBASE-CX4) capable of 15 m over appropriate CX4-grade copper cables. Receives LC connector.

XFP Transceiver 850nm 300m MMF (#2110): Provides 10 Gbps Short-Reach (850 nm) XFP transceiver (10GBASE-SR) capable of 300 m over multimode fiber with optical monitoring capabilities. Receives LC connector.

XFP Transceiver 1310nm 10Km SMF (#2111): Provides 10 Gbps Long-Reach (1310 nm) XFP transceiver (10GBASE-LR) capable of 10 km over single-mode fiber with optical monitoring capabilities. Receives LC connector.

XFP Transceiver 1550nm 40Km SMF (#2112): Provides 10 Gbps Extended Reach (1550 nm) XFP transceiver (10GBASE-ER) capable of 40 km over single-mode fiber with optical monitoring capabilities. Receives LC connector.

SFP+ Transceiver 10 GbE SR 300m MMF (#2130): Provides 10 Gbps Short-Reach (850 nm) SFP+ transceiver (10GBASE-SR) capable of 300m over multimode fiber. Receives LC connector.

SFP+ Transceiver 10 GbE LR, 10Km SMF (#2131): Provides 10 Gbps Long-Reach (1310 nm) SFP+ transceiver (10GBASE-LR) capable of 10 km over single-mode fiber. Receives LC connector.

SFP Transceiver 1GE Copper RJ-45 (#2202): Provides passive 1 Gbps SFP transceiver (1000BASE-T) capable of 100 m over CAT5 or higher cabling with copper RJ-45 connector.

SFP Transceiver 1GE SX MMF w/OM (#2211): Provides 1 Gbps Short wavelength (850 nm) SFP transceiver (1000BASE-SX) capable of 550 m over multimode fiber with optical monitoring capabilities. Receives LC connector.

SFP Transceiver 1GE LX SMF w/OM (#2212): Provides 1 Gbps Long wavelength (1310 nm) SFP transceiver (1000BASE-LX) capable of 10 km over single-mode fiber with optical monitoring capabilities. Receives LC connector.

SFP Transceiver 1GE LHA SMF w/OM (#2213): Provides 1 Gbps Extra Long wavelength (1550 nm) SFP transceiver (1000BASE-LHA) capable of 70 km over single-mode fiber with optical monitoring capabilities. Receives LC connector.

SFP Transceiver 100MbE MMF w/OM (#2216): Provides 100 Mbps Short wavelength (1310 nm) SFP transceiver (100BASE-FX) capable of 2 km over multimode fiber with optical monitoring capabilities. Receives LC connector.

MID-Mount Rack mount kit 4-slot (#5900), 8-slot (#5901), and 16-slot (#5902):

The IBM Ethernet Switch B04R (4003-R04) and IBM Ethernet Switch B08R (4003-R08) have fixed front mount brackets. The IBM Ethernet Switch B16R (4003-R16) has adjustable mounting brackets. These options (#5900, #5901, and #5902) provide additional mounting brackets that can be installed on the chassis to do a mid-mount installation.

2400 W ac power supply 32-slot, 200-240 V ac (#8651): The 2400 W ac power supply 32-slot, 200-240 V ac (#8651) provides power supplies for the IBM Ethernet Switch B32R (4003-R32). The 4003-R32 accommodates eight 2400 W ac power supplies with four required plus four redundant. This power supply is hot swappable.

1200 W ac power supply 8/16-slot, 90-264 V ac (#8652): The 1200 W ac power supply 8/16-slot, 90-264 V ac (#8652) provides power supplies for the IBM Ethernet Switch B16R (4003-R16) and IBM Ethernet Switch B08R (4003-R08). The 4003-R16 accommodates eight 1200 W ac power supplies with four required plus four redundant. The 4003-R08 accommodates four 1200 W ac power supplies with two required plus two redundant. This power supply is hot swappable.

1200 W ac power supply 4-slot, 90-264 V ac (#8653): The 1200 W ac power supply 4-slot, 90-264 V ac (#8653) provides power supplies for the IBM Ethernet

Switch B04R (4003-R04). The 4003-R04 accommodates three 1200 W ac power supplies with one required plus two redundant. This power supply is hot swappable.

128 MB PCMCIA ATA flash memory for management modules (#8710): This feature is a specially formatted flash PCMCIA card for the 32-slot Management Module (#1651) for the IBM Ethernet Switch B32R (4003-R32), and the 4/8/16-slot Management Module (#1652) for the IBM Ethernet Switch B16R (4003-R16), IBM Ethernet Switch B08R (4003-R08), and IBM Ethernet Switch B04R (4003-R04). The flash card can store up to 128 MB of system files, including boot images, startup configuration files, and running configuration files. As a result, system management tasks such as copying files between the flash card and flash memory on the Management Module can also be performed.

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product number

Description	Machine type	Model	Feature number
IBM Ethernet Switch B04R	4003	R04	
4/8/16-slot Mgmt Module			1652
4-slot Switch Fabric Module			1654
4-port Module 10GbE (XFP)			1661
16-port Module 10GbE (SFP+)			1662
24-port Module 1GbE (RJ45)			1663
48-port Module 1GbE (MRJ21)			1664
24-port Module 1GbE (Fiber)			1665
XFP 10GB Copper 15m CX4			2101
XFP 850nm 300m MMF			2110
XFP 1310nm 10Km SMF			2111
XFP 1550nm 40Km SMF			2112
SFP+ 10 GbE SR 300m MMF			2130
SFP+ 10 GbE LR 10Km SMF			2131
SFP 1GE Copper RJ-45			2202
SFP 1GE SX MMF w/OM			2211
SFP 1GE LX SMF w/OM			2212
SFP 1GE LHA SMF w/OM			2213
SFP 100MbE MMF w/OM			2216
SFP 1GE Copper RJ-45 8-Pack			2801
SFP 100MbE MMF w/OM 8-Pack			2810
SFP 1GE SX MMF w/OM 8-Pack			2811
SFP 1GE LX SMF w/OM 8-Pack			2812
SFP 1GE LHA SMF w/OM 8-Pack			2813
SFP+ 10 GbE SR 300m MMF 8-P			2830
SFP+ 10 GbE LR 10Km SMF 8-P			2831
Mid-mount Rack Kit 4-slot			5900
4003-R04 FW upgrade 1 year			7093
1200 W ac PS 4-slot			8653
128MB Flash Memory			8710
Power cord US NEMA 5-20P			9600
Power cord US NEMA 6-15P			9601
Power cord UK			9602
Power cord Europe			9603
Power cord US NEMA 6-20P			9604
Power cord US IEC 60320-C20			9605
Power cord Nema L6-20P			9606
Power cord Japan			9608
Power cord India, UK			9609
Power cord India, S.Africa			9610
Power cord China			9611

Power cord Australia			9612
Power cord Swiss			9613
Power cord (China IEC 309)			9614

Description	Machine type	Model	Feature number
IBM Ethernet Switch B08R	4003	R08	
4/8/16-slot Mgmt Module			1652
8/16-slot Switch Fabric			1653
4-port Module 10GbE (XFP)			1661
16-port Module 10GbE (SFP+)			1662
24-port Module 1GbE (RJ45)			1663
48-port Module 1GbE (MRJ21)			1664
24-port Module 1GbE (Fiber)			1665
XFP 10GB Copper 15m CX4			2101
XFP 850nm 300m MMF			2110
XFP 1310nm 10Km SMF			2111
XFP 1550nm 40Km SMF			2112
SFP+ 10 GbE SR 300m MMF			2130
SFP+ 10 GbE LR 10Km SMF			2131
SFP 1GE Copper RJ-45			2202
SFP 1GE SX MMF w/OM			2211
SFP 1GE LX SMF w/OM			2212
SFP 1GE LHA SMF w/OM			2213
SFP 100MbE MMF w/OM			2216
SFP 1GE Copper RJ-45 8-Pack			2801
SFP 100MbE MMF w/OM 8-Pack			2810
SFP 1GE SX MMF w/OM 8-Pack			2811
SFP 1GE LX SMF w/OM 8-Pack			2812
SFP 1GE LHA SMF w/OM 8-Pack			2813
SFP+ 10 GbE SR 300m MMF 8-P			2830
SFP+ 10 GbE LR 10Km SMF 8-P			2831
Mid-mount Rack Kit 8-slot			5901
4003-R08 FW upgrade 1 year			7092
1200 W ac PS 8/16-slot			8652
128MB Flash Memory			8710
Power cord US NEMA 5-20P			9600
Power cord US NEMA 6-15P			9601
Power cord UK			9602
Power cord Europe			9603
Power cord US NEMA 6-20P			9604
Power cord US IEC 60320-C20			9605
Power cord Nema L6-20P			9606
Power cord Japan			9608
Power cord India, UK			9609
Power cord India, S.Africa			9610
Power cord China			9611
Power cord Australia			9612
Power cord Swiss			9613
Power cord (China IEC 309)			9614

Description	Machine type	Model	Feature number
IBM Ethernet Switch B16R	4003	R16	
4/8/16-slot Mgmt Module			1652
8/16-slot Switch Fabric			1653
4-port Module 10GbE (XFP)			1661
16-port Module 10GbE (SFP+)			1662
24-port Module 1GbE (RJ45)			1663
48-port Module 1GbE (MRJ21)			1664
24-port Module 1GbE (Fiber)			1665
XFP 10GB Copper 15m CX4			2101
XFP 850nm 300m MMF			2110
XFP 1310nm 10Km SMF			2111
XFP 1550nm 40Km SMF			2112
SFP+ 10 GbE SR 300m MMF			2130
SFP+ 10 GbE LR 10Km SMF			2131
SFP 1GE Copper RJ-45			2202

SFP 1GE SX MMF w/OM			2211
SFP 1GE LX SMF w/OM			2212
SFP 1GE LHA SMF w/OM			2213
SFP 100MbE MMF w/OM			2216
SFP 1GE Copper RJ-45 8-Pack			2801
SFP 100MbE MMF w/OM 8-Pack			2810
SFP 1GE SX MMF w/OM 8-Pack			2811
SFP 1GE LX SMF w/OM 8-Pack			2812
SFP 1GE LHA SMF w/OM 8-Pack			2813
SFP+ 10 GbE SR 300m MMF 8-P			2830
SFP+ 10 GbE LR 10Km SMF 8-P			2831
Mid-mount Rack Kit 16-slot			5902
4003-R16 FW upgrade 1 year			7091
1200 W ac PS 8/16-slot			8652
128MB Flash Memory			8710
Power cord US NEMA 5-20P			9600
Power cord US NEMA 6-15P			9601
Power cord UK			9602
Power cord Europe			9603
Power cord US NEMA 6-20P			9604
Power cord US IEC 60320-C20			9605
Power cord Nema L6-20P			9606
Power cord Japan			9608
Power cord India, UK			9609
Power cord India, S.Africa			9610
Power cord China			9611
Power cord Australia			9612
Power cord Swiss			9613
Power cord (China IEC 309)			9614

Description	Machine type	Model	Feature number
IBM Ethernet Switch B32R	4003	R32	
32-slot Mgmt Module			1651
4-port Module 10GbE (XFP)			1661
16-port Module 10GbE (SFP+)			1662
24-port Module 1GbE (RJ45)			1663
48-port Module 1GbE (MRJ21)			1664
24-port Module 1GbE (Fiber)			1665
XFP 10GB Copper 15m CX4			2101
XFP 850nm 300m MMF			2110
XFP 1310nm 10Km SMF			2111
XFP 1550nm 40Km SMF			2112
SFP+ 10 GbE SR 300m MMF			2130
SFP+ 10 GbE LR 10Km SMF			2131
SFP 1GE Copper RJ-45			2202
SFP 1GE SX MMF w/OM			2211
SFP 1GE LX SMF w/OM			2212
SFP 1GE LHA SMF w/OM			2213
SFP 100MbE MMF w/OM			2216
SFP 1GE Copper RJ-45 8-Pack			2801
SFP 100MbE MMF w/OM 8-Pack			2810
SFP 1GE SX MMF w/OM 8-Pack			2811
SFP 1GE LX SMF w/OM 8-Pack			2812
SFP 1GE LHA SMF w/OM 8-Pack			2813
SFP+ 10 GbE SR 300m MMF 8-P			2830
SFP+ 10 GbE LR 10Km SMF 8-P			2831
4003-R32 FW upgrade 1 year			7090
2400 W ac PS 32-slot			8651
128MB Flash Memory			8710
Power cord US NEMA 6-15P			9601
Power cord UK			9602
Power cord Europe			9603
Power cord US NEMA 6-20P			9604
Power cord US IEC 60320-C20			9605
Power cord Nema L6-20P			9606
Power cord India, UK			9609
Power cord India, S.Africa			9610
Power cord China			9611
Power cord Australia			9612
Power cord Swiss			9613

Power cord (China IEC 309)	9614

Model conversions

Not applicable.

Feature conversions

Not applicable.

Publications

The following publication is shipped as hardcopy with the product.

Title	Order number
IBM r-series of Ethernet Switches Installation and User Guide	GC27-2266

Additional copies of the above listed publications will be available on August 25, 2009.

The following publication will be available on **August 25, 2009.**

Title	Order number
IBM r-series of Ethernet Switches Installation and User Guide	GC27-2266

You can use the following options to order or download additional copies:

- To order additional selected hardcopy publications for a fee or download free PDF format publications, visit the IBM Publications Center Web site

  http://www.ibm.com/shop/publications/order
- To directly download publications in PDF format, visit the IBM product support Web site

  http://www.ibm.com/storage/support
- Call the Publications Support Group at 800-879-2755, and select option 1
- Contact your IBM representative

The IBM Publications Center

Hardcopies of selected publications are available for a fee from the IBM Publications Center, as well as free softcopy publications. The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. Payment options for orders are via credit card or customer number. A large number of publications are available online in various file formats, and they can all be downloaded free of charge.

Publications are shipped with the product and have been revised to reflect this announcement. To directly download translated publications in PDF format, visit the IBM Publications Center at

http://www.ibm.com/shop/publications/order

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

http://www.ibm.com/services/

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

The IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) are suitable for installation in a Network Telecommunications facility and where NEC requirements apply. Additionally, it may be installed in either a Common Bonding Network (CBN) or Isolated Bonding Network (IBN). It is not intended for Outside Plant installations (OSP). The models can be mounted in a 19-inch Electronic Industries Association (EIA310-D), two-post Telco rack using front mounting brackets and mounting kit provided.

It is recommended that the IBM Ethernet Switch B32R be installed in environments that have minimal dust and airborne contaminants. If this switch is used in environments where dust or other airborne contaminants may be prevalent, air filters should be inspected annually and replaced if needed. Maintaining clean air filters ensures optimal airflow through the machine. Replacement of filters is a customer responsibility. These are not covered under the machine warranty or maintenance agreements. Replacement air filter (part number 45W5381) can be purchased at

http://www.ibm.com

Call your IBM representative for further information.

	4003-R04
Height:	17.7 cm (6.96 in)
Depth:	57.15 cm (22.5 in)
Width:	44.32 cm (17.45 in)
System weight:	35 kg (78 lbs) fully loaded

4003-R08

Height:	31 cm	(12.21 in)
Depth:	57.15 cm	(22.5 in)
Width:	44.32 cm	(17.45 in)
System weight:	60 kg	(131 lbs) fully loaded

4003-R16

Height:	62.15 cm	(24.47 in)
Depth:	64.77 cm	(25.5 in)
Width:	44.32 cm	(17.45 in)
System weight:	107 kg	(236 lbs) fully loaded

4003-R32

Height:	146.5 cm	(57.71 in)
Depth:	61.21 cm	(24.1 in)
Width:	44.32 cm	(17.45 in)
System weight:	217 kg	(478 lb) fully loaded

For installation into non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Operating environment

- Operating temperature: 0° to 40° C (32° to 104° F)
- Non-operating: -25° to 70° C (-13° to 158° F)
- Humidity operating: 5% to 90%, noncondensing at 40° C (104° F)
- Humidity non-operating: 10% to 95%, noncondensing at 70° C (158° F)
- Operating altitude: 0 to 2,012 m (6,600 ft)
- Storage altitude: 0 to 4.5 km (0 - 15,000 ft)

EMC conformance

- CSA950 Electromagnetic Emission Certification
- FCC Class A
- EN 55022/CISPR-22 Class A/ VCCI Class A
- ICES-003 Electromagnetic Emission

Product safety/Country testing/Certification:

- CAN/CSA-C22.2 No. 60950-1-03/UL60950-1 - First Edition, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EN 60825-2 Safety of Laser Products - Part 2: Safety of Optical Fibre Communications Systems
- EN 60950-1:2001\IEC 60950-1 Safety of Information Technology Equipment

The IBM Ethernet products in this announcement are not approved to be sold for connecting to the public telecommunication networks in all countries. IBM continues working to obtain approval to connect to public telecommunication networks in the currently restricted countries. Availability will be published in the future. At this time, these products are not available in the following countries:

Algeria	Guinea	Niger	Burkina Faso
Belarus	Haiti	Nigeria	Cape Verde
Bahrain	Jordan	Oman	Central African Republic
Belize	Kuwait	Qatar	Congo, Republic of the
Benin	Laos	Russia	Cote d'Ivoire
Botswana	Lesotho	Rwanda	Dominican Republic
Brazil	Liberia	Samoa	

Brunei	Malawi	Serbia	Myanmar (Burma)
Burundi	Maldives	Somalia	Papua New Guinea
Cameroon	Mali	Suriname	
Chad	Mauritania	Tanzania	Sierra Leone
Djibouti	Moldavia	Togo	United Arab Emirates
Eritrea	Mongolia	Uganda	Wallis and Futuna
Ethiopia	Montenegro	Venezuela	West Bank
Gabon	Mozambique	Yemen	South Africa
Gambia	Nepal	Zambia	Tajikistan
Ghana	Nicaragua	Kazakhstan	Turkmenistan
Armenia	China	Kyrgyzstan	Ukraine
Azerbaijan	Georgia	Lebanon	Uzbekistan
Cambodia	Iraq	Mexico	Vietnam

In Japan, customers need to notify their telecommunication service provider of their intent to attach any of the networking products in this announcement to the public telephone network. Such notification should include a detailed description of the product to be used, date and time of installation, and a completed public telecommunications networks service request form.

Hardware requirements

Supported servers

The IBM Ethernet Switches B04R, B08R, B16R, and B32R are designed to support network connectivity for the following servers:

- IBM System z® servers
- IBM Power® Systems
- IBM System p® servers
- IBM System i® servers
- IBM System x® servers

Software requirements

Compatibility

The IBM Ethernet Switch B04R, B08R, B16R, and B32R supports the following features:

IEEE

- IEEE 802.3ae 10-Gigabit Ethernet
- IEEE 802.3x Flow Control
- IEEE 802.3ad Link Aggregation
- IEEE 802.1Q VLAN Tagging
- IEEE 802.1D Bridging
- IEEE 802.1w Rapid STP
- IEEE 802.1s Multiple Spanning Tree Protocol
- IEEE 802.1X User authentication
- IEEE 802.3 Ethernet Like MIB

BGP-4

- RFC 4271 BGPv4
- RFC 1745 OSPF interactions
- RFC 1997 Communities & Attributes
- RFC 2439 route flap dampening
- RFC 2796 route reflection

- RFC 3065 BGP4 confederations
- RFC 3392 Capability Advertisement
- RFC 2918 Route Refresh Capability
- RFC 1269 Managed Objects for BGP
- RFC 1657 Managed Objects for BGP-4 using SMIv2
- RFC 3682 Generalized TTTTL Security Mechanism for eBGP Session

Protection

- RFC 2385 BGP Session Protection via TCTCP MD5
- draft-ietf-idr-restart Graceful Restart for BGP
- draft-ieft-idr-route-filter

OSPF

- RFC 2178 OSPF
- RFC 1583 OSPF v2
- RFC 3101 OSPF NSSA
- RFC 1745 OSPF Interactions
- RFC 1765 OSPF Database Overflow
- RFC 1850 OSPF v2 MIB and Traps
- RFC 2154 OSPF w/Digital Signatures (Password, MD-5)
- RFC 2328 OSPF v2
- RFC 2370 OSPF Opaque LSA Option
- RFC 3623 Graceful OSPF Restart

IS-IS

- RFC 1195 Routing in TCTCP/IP and Dual Environments
- RFC 2763 Dynamic Host Name Exchange
- RFC 2966 Domain-wide Prefix Distribution
- RFC 3567 IS-IS Cryptographic Authentication (MDS)

RIP

- RFC 1058 RIP v1
- RFC 1723 RIP v2
- RFC 1812 RIP Requirements

IP Multicast

- RFC 1122 Host Extensions
- RFC 1256 ICMP Router Discovery Protocol
- RFC 1112 IGMP
- RFC 2236 IGMP v2
- RFC 2362 PIM-SM
- RFC 3973 PIM-DM
- PIM-DM v1
- DVMRP v3-07
- RFC 1075 DVMRP v2
- RFC 2336 IGMP v2
- RFC 3618 MSDP
- RFC 2283 MBGP

- RFC 2858 BGP-MP
- RFC 3376 IGMP v3
- RFC 3446 Anycast RP
- RFC 4541 Considerations for IGMP and MLD Snooping

General protocols

- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCTCP
- RFC 783 TFTP
- RFC 826 ARP
- RFC 768 UDP
- RFC 894 IP over Ethernet
- RFC 903 RARP
- RFC 906 TFTP Bootstrap
- RFC 1027 Proxy ARP
- RFC 950 Subnets
- RFC 951 BootP
- RFC 1122 Host Requirements
- RFC 1256 IRDP
- RFC 1519 CIDR
- RFC 1542 BootP Extensions
- RFC 1812 General Routing
- RFC 1541 and 1542 DHCP
- RFC 2131 BootP/DHCP Helper
- RFC 3768 VRRP
- RFC 854 TELNET
- RFC 1591 DNS (client)
- RFC 2784 GRE
- RFC 1191 Path MTU Discovery
- RFC 896 Congestion Control
- RFC 3635 Pause Control
- RFC 1858 IP Fragment Filtering
- RFC 1340 Assigned Numbers

Others

- RFC 2578 SMIv2
- RFC 2579 Textual Conventions for SMIv2
- RFC 2665 Ethernet Interface MIB
- RFC 1354 IP Forwarding MIB
- RFC 1757 RMON Groups Partial 1, full for 2, 3, 9
- RFC 2068 HTTTTP
- RFC 2030 SNTP
- RFC 2138 RADADIUS
- RFC 3176 sFlow
- Draft-ietf-tcpm-tcpsecure-00

IPv6 core

- RFC 2373 IPv6 Addressing architecture
- RFC 1886 DNS Extensions to support IPv6
- RFC 1887 IPV6 Unicast address allocation architecture
- RFC 2374 IPv6 aggregatable global Unicast address format
- RFC 2450 Proposed TLA and NLA Assignment Rules
- RFC 2471 IPv6 testing address allocation
- RFC 2526 Reserved IPv6 subnet anycast address
- RFC 2928 Initial IPv6 sub TLA ID assignments
- RFC 2460 IPv6 Specification
- RFC 2461 IPv6 Neighbor Discovery
- RFC 2462 IPv6 Stateless Address Auto-configuration
- RFC 4443 ICMPv6
- RFC 3513 IPv6 Addressing Architecture
- RFC 1981 IPv6 Path MTU Discovery
- RFC 3587 IPv6 Global Unicast Address Format
- RFC 2375 IPv6 Multicast Address Assignments
- RFC 2464 Transmission of IPv6 over Ethernet Networks
- RFC 2711 IPv6 Router Alert Option
- RFC 3363 DNS support

IPv6 routing

- RFC 2080 RIPng for IPv6
- RFC 2740 OSPFv3 for IPv6
- IETF Draft_ietf_isis_IPv6 IS-IS for IPv6
- RFC 2545 Use of MP-BGP-4 for IPv6

IPv6 multicast

- RFC 2362 PIM-SM
- RFC 2710 Multicast Listener Discovery (MLD) for IPv6
- RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
- RFC 3810 MLDv2
- RFC 4602 PIM-SM (Partial Address)
- draft-holbrook-idmr-igmpv3-ssm-IGMPv3 & MDLV2 for SSM
- draft-ietf-ssm-arch SSM for IP

IPv6 transitioning

- RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
- RFC 3056 Connection of IPv6 Domains via IPv4 Clouds

Network management

- RFC 3176 sFlow
- RFC 854 Telnet
- RFC 2068 HTTP
- RFC 2578 and 3410 SNMPv2 and v3
- RFC 1757 RMON Group partial 1, full 2, 3, and 9
- SNMP MIB II

Element security options

- AAA
- RADIUS
- Secure Shell (SSH v2)
- Secure Copy (SCP)
- TACACS/TACACS+
- Username/Password (Challenge and Response)
- Bi-level Access Mode (Standard and EXEC Level)
- Protection for Denial of Service attacks, such as TCTCP SYN or Smurf Attacks

System management

- Industry Standard Command Line Interface (CLI)
- IronView Network Manager (INM) Web-based Graphical User Interface (GUI)
- SNMP v1, v2c, v3
- RMON
- HP OpenView for Sun Solaris, HP-UX, IBM AIX®, and Windows NT®
- IBM Tivoli® Netcool/OMNIbus™

Performance

- IBM Ethernet Switch B04R (4003-B04R)
  - 400 Gbps available data capacity
  - 960 Gbps total switch capacity
  - 286 MPPS forwarding capacity
- IBM Ethernet Switch B08R (4003-B08R)
  - 800 Gbps available data capacity
  - 1.92 Tbps total switch capacity
  - 571 Mpps forwarding capacity
- IBM Ethernet Switch B16R (4003-B16R)
  - 1.60 Tbps available data capacity
  - 3.84 Tbps total switch capacity
  - 1,142 Mpps forwarding capacity
- IBM Ethernet Switch B32R (4003-B32R)
  - 3.2 Tbps available data capacity
  - 5.12 Tbps total switch capacity
  - 2,284 Mpps forwarding capacity

Scalability

- 512,000 IPv4 routes in FIB (hardware)
- 64,000 IPv6 routes in FIB (hardware)
- BGPv4: 1 million routes, 256 peers
- BGPv6: 300,000 routes, 100 peers
- OSPFv2: 400,000 routes
- OSPFv3: 65,536
- IS-IS 25,000 routes, 512 adjacencies, and support for Level 1 and Level 2
- ACLs: 8,000
- Link aggregation: 8 links per group, 80 Gbps links

Maximum frame size: 9k

Data traffic types: Unicast, multicast, and broadcast IP traffic.

Limitations

Notice: Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your system installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Planning information

Customer responsibilities

Planning information, including customer responsibilities, physical planning, and installability is available in the specific product planning manuals on the following Web site

http://www.ibm.com/systems/networking

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Cable orders

The media installed in the chassis require appropriate cables for connectivity. Cables must be supplied by the customer. 10 Gbps optical XFP, 10 Gbps optical SFP+, or 1 Gbps optical SFP transceivers require single-mode fiber (SMF) or multimode fiber (MMF) terminating in a LC connector. Refer to the media description for proper cable type. 10 Gbps copper XFP transceivers require CX4-grade copper cables. 1 Gbps copper SFP transceivers with RJ-45 ports or RJ-45 ports on interface modules require CAT5e or higher cabling. Mini RJ-21 connectors require MRJ21 to RJ45 breakout cables.

For information on available products, and where to buy MRJ21 cabling and patch panels, contact your IBM representative or visit

http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/DCN_MiniRJ21_Cable_Information

Installability

Hardware installation time for the IBM Ethernet Switch B04R (4003-R04), IBM Ethernet Switch B08R (4003-R08), IBM Ethernet Switch B16R (4003-R16), and IBM Ethernet Switch B32R (4003-R32) is estimated at less than two hours.

Security, auditability, and control

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, and/or integration of this product.

Terms and conditions

Warranty period

One Year

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 or a Tier 2 CRU.

Tier 1 CRU

Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next business day (NBD) delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- Management module
- Switch Fabric modules (except for Model R32)
- 24-port and 2-port interface module
- Transceivers (except #2813 and #2831)
- Power supplies
- Fans

On-Site service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is:

- 9 hours per day, Monday through Friday, excluding public or national holidays, next-business-day response.

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. Refer to the Warranty service section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offerings are:

- 9 hours per day, Monday through Friday, excluding public or national holidays, same-business-day response. Calls must be received by 12:00 local time in order to qualify for same business day response.
- 24 hours per day, 7 days a week, 6 hour average, same day response.

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service, except that you may install a CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified above. For additional information on the CRU Service, see the warranty information.

Maintenance services options

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service levels are:

- 9 hours per day, Monday through Friday, excluding public or national holidays, next-business-day response. Calls must be received by 3:00 pm local time in order to qualify for next business day response.
- 24 hours per day, 7 days a week, 6 hour average, same day response.

Additional reference for Europe

Refer to the following European documents:

- European Announcement Letter ZS03-0150 for IBM Customer Agreement (ICA)
- European Announcement Letter ZS04-0135 for Enterprise Agreement Contract
- European Announcement Letter ZS98-0118 for ServiceSuite™ Contract
- European HW Operations Guide and Service Level Description Table available at

  http://www-5.ibm.com/services/europe/maintenance/

Usage plan machine

No

IBM hourly service rate classification

Two

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Maintenance service offerings

This machine is eligible under terms and conditions of IBM ServiceSuite, the IBM Enterprise Service Agreement (ESA), or the IBM Maintenance Agreement. Consult your IBM representative for details.

Field-installable features

Yes

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply

No

Licensed machine code

IBM Ethernet Switch r-series routers licensed machine code is licensed for use by a customer on the IBM machine for which it was provided under the terms and conditions of the Brocade End User License Agreement, to enable a specific machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative.

IBM may release changes to the licensed machine code. IBM plans to make the licensed machine code changes available for download from IBM technical support at

http://www.ibm.com/systems/support/networking

If the machine does not function as warranted and your problem can be resolved through your application of downloadable licensed machine code, you are responsible for downloading and installing these designated licensed machine code changes as IBM specifies. If you would prefer, you may request IBM to install the downloadable licensed Machine code changes; however, you may be charged for that service.

Business Partner terms and conditions

The IBM Ethernet Switch B04R, IBM Ethernet Switch B08R, IBM Ethernet Switch B16R, and IBM Ethernet Switch B32R:

Category

Receive BP base discount Category M.

The products are added to Approval Category M.

For more information, Business Partners should refer to the relevant product exhibits on

https://www.developer.ibm.com/partnerworld/mem/pat/pat_sas.html

Prices

For all local charges, contact your IBM representative.

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http://www.ibm.com/financing

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For more financing information, please visit

http://www.ibm.com/financing

Announcement countries

All European, Middle Eastern, and African countries except:

Algeria	Jordan	Russia	Sierra Leone
Bahrain	Kuwait	Rwanda	United Arab Emirates

Benin	Lesotho	Serbia	West Bank
Botswana	Liberia	Somalia	Yemen
Burundi	Malawi	Tanzania	
Cameroon	Mali	Togo	
Chad	Mauritania	Uganda	
Djibouti	Moldavia	Zambia	
Eritrea	Montenegro	Burkina Faso	
Ethiopia	Mozambique	Cape Verde	
Gabon	Niger	Central African Republic	
Gambia	Nigeria	Congo, Republic of the	
Ghana	Oman	Cote d'Ivoire	
Guinea	Qatar	Belarus	
Armenia	Tajikistan	South Africa	
Azerbaijan	Turkmenistan	Kyrgyzstan	
Georgia	Ukraine	Uzbekistan	
Kazakhstan	Iraq	Lebanon	

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